SUMMER REPRODUCTIVE DORMANCY IN *BIPRORULUS BIBAX* (BREDDIN) (HEMIPTERA: PENTATOMIDAE) ON *EREMOCITRUS GLAUCA* (RUTACEAE) IN SOUTH-EASTERN QUEENSLAND AND WESTERN NEW SOUTH WALES

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Abstract

Non-reproductive populations of *Biprorulus bibax* were observed on *Eremocitrus glauca* (Lindl.) Swing. during summer (January) at Roma, Chinchilla (Queensland) and Roto (New South Wales). Females contained large amounts of fat body and showed no ovarian development. The pre-oviposition period of females from Roma (43 d) and Chinchilla (21 d) in the laboratory (25°C, LD 15:9 h) was significantly longer than in females collected at Leeton in southern New South Wales (1 d). The significance of summer reproductive dormancy in *B. bibax* is discussed.

Introduction

B. bibax is an increasing pest of citrus in south-eastern Australia. Since 1975 it has become established in all major citrus growing areas of southern New South Wales, Victoria and South Australia (James 1989). Research is currently directed towards development of management programmes which are not based on pesticides (James 1988; James and Warren 1989). Consequently, attention is being paid to its biology and ecology (James 1990 a,b,c,).

In southern New South Wales overwintering *B. bibax* are non-reproductive, contain extensive lipid reserves and congregate in large numbers on non-lemon citrus (James 1990b). During spring-autumn adults are reproductive and produce 2-3 generations of nymphs (James 1990a,b). During studies on populations of *B. bibax* on a native host, *E. glauca* in western areas of Queensland and New South Wales, the occurrence of non-reproductive bugs during summer was noted.

Methods

Populations of *B. bibax* were examined on *E. glauca* at two sites near Roma and two near Chinchilla in Western Queensland during 7-9 January 1990. A population near Roto, north of Hillston in western New South Wales was visited on 23 January. At each site all stages of *B. bibax* were collected during a three hour search of host plants. Female bugs were either killed and dissected for determination of reproductive status and fat content, or held in female-male pairs at 25°C, LD 15:9 h. Ovaries were examined for oocytes and a distended, pigmented spermatheca indicated insemination. Fat content was assessed arbitrarily as high or low depending on similarity to the fat body of non-reproductive winter bugs or reproductive summer bugs, respectively (James 1990b).

Bug pairs from Queensland were held in muslin covered plastic cups (11 cm dia.) and supplied with immature lemons. Bugs obtained from a reproductive population on lemons at Leeton in southern New South Wales on 28 January

were also set up in pairs. All bugs were examined daily with date of first oviposition and death recorded for each pair.

Results and discussion

Eleven adult bugs/hour were found at each of the Roma sites. No fresh eggs or nymphs were seen but 3 batches of hatched eggs were found at both sites. Nineteen adults/hour were collected from one Chinchilla site, of which, thirteen were clustered on the main stem of a small (0.5 m) *E. glauca* plant. Five adults/hour were found at the second Chinchilla site. No eggs or nymphs were found. At Roto 31 adults/hour were recorded and no nymphs or fresh eggs were found.

Examination of 10 females from Roma and 10 from Roto showed all to be non-reproductive. All were unmated, showed no ovarian development and contained a large fat body similar to that found in reproductively inactive winter bugs (James 1990b).

Data on pre-oviposition period and longevity of bugs from each locality are shown in Table 1. Bugs from Leeton generally laid eggs within a day of arrival in the laboratory. In contrast, the pre-oviposition period was 3 weeks in females from Chinchilla and significantly longer (6 weeks) in females from Roma.

These observations suggest that *B. bibax* undergoes a summer reproductive dormancy on *E. glauca* in far western areas of Queensland and New South Wales. During January populations consisted of adults only and females had undeveloped ovaries and contained profuse amounts of fat body similar to that found in non-reproductive winter bugs in southern New South Wales (James 1990b). The clustering of bugs on *E. glauca* at Chinchilla was similar to the behaviour of overwintering bugs in southern New South Wales where groupings of 5-500 bugs are common (James 1990b).

The delay in oviposition in *B. bibax* collected from western areas in January and transferred to conditions favourable for development (Summerville 1931; James 1990a), suggests that the bugs were in reproductive diapause (Danks 1987). In the laboratory females collected in southern New South Wales in January showed no delay in oviposition.

E. glauca is the major host of *B. bibax* (Summerville 1931) and although it is drought tolerant, the retention of fruit on trees during summer appears to be moisture dependent. Very little fruit was available in Roma and Chinchilla in January. In a few areas at Roto fruit was retained until autumn. Although *B. bibax* can survive by feeding on vegetative parts of *E. glauca* (unpubl. obs.), this diet may not support reproduction. In the laboratory, *B. bibax* will survive and feed on the sap of many plant species, developing fat body but no eggs (unpubl. obs.). If citrus fruit is essential for reproduction in *B. bibax*, then summer breeding will be impossible in areas where fruit is unavailable. Summer reproduction in *B. bibax* does occur 200 km north-east of Chinchilla on commercial citrus in the Mundubbera-Gayndah district (Summerville

Table 1. Mean (±SE) pre-oviposition period and longevity of *B. bibax* collected during January in Queensland and New South Wales and held under 25°C, LD 15:9 h.

Origin	Date	n	Pre-oviposition period (days)	Longevity (days)
Roma	7.i.90	5	43±6	73±6 #
Chinchilla	8.i.90	6	21±2	50±3
Leeton	28.i.90	10	1±0.2	69±5 #

All means significantly different (Anova: $P<0.05$) except #

1931; D. Papacek, *pers. comm.*). Similarly reproduction continues throughout summer on commercial citrus in inland southern New South Wales and Victoria.

E. glauca sets fruit during October/November and the presence of old, hatched eggs at the 3 sites in January suggests that some reproduction of *B. bibax* occurred in spring. The fate of summer, non-reproductive bugs in these areas in unclear. Unless they move to another host with fruit, reproductive dormancy could continue until the following spring. Summerville (1931) suggested the possibility of bugs overwintering on another host plant such as *Microcitrus australasica* (F. Muell.) Swing. As in New South Wales, reproduction of *B. bibax* does not occur during winter in Queensland (Summerville 1931; James 1990b,c). *E. glauca* and the hot, dry western areas of New South Wales and Queensland may represent the ancestral habitat of a univoltine *B. bibax* reproducing only in the spring. Occupation of areas with hosts which retain fruit during summer, eg. commercial citrus, could have enabled *B. bibax* to become multivoltine (James 1989; 1990c).

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